

2020 Spring Outlook

For Northern & Central New Mexico



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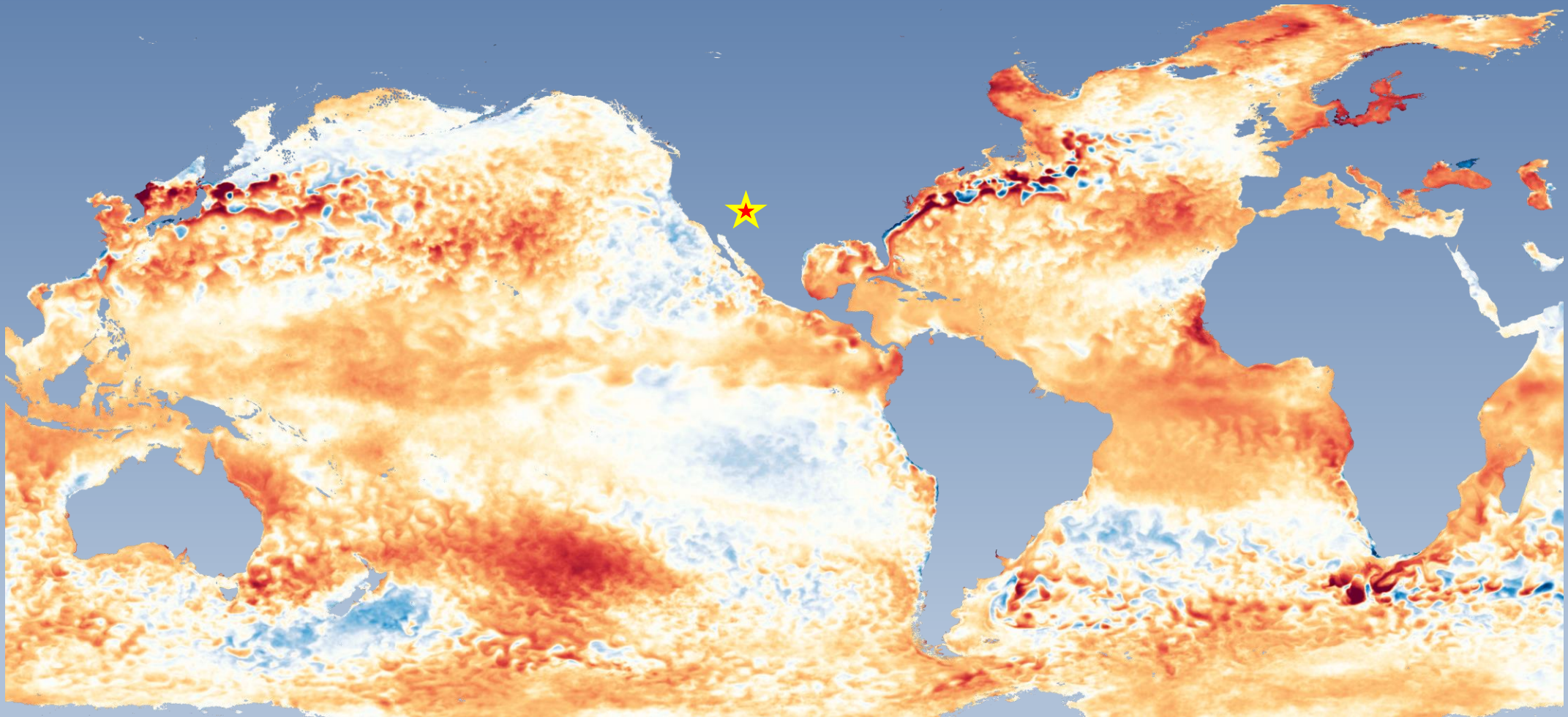


Figure 1. Sea Surface Temperature Anomalies from mid February 2020. The Pacific Ocean remains warmer than average but it does not meet El Niño criteria and is considered in a neutral state. There is a 60% chance that ENSO-neutral conditions will continue through the spring, with a 50% chance of neutral through the summer. (ENSO = El Niño/Southern Oscillation, the whole ocean/atmosphere El Niño/La Niña system.)

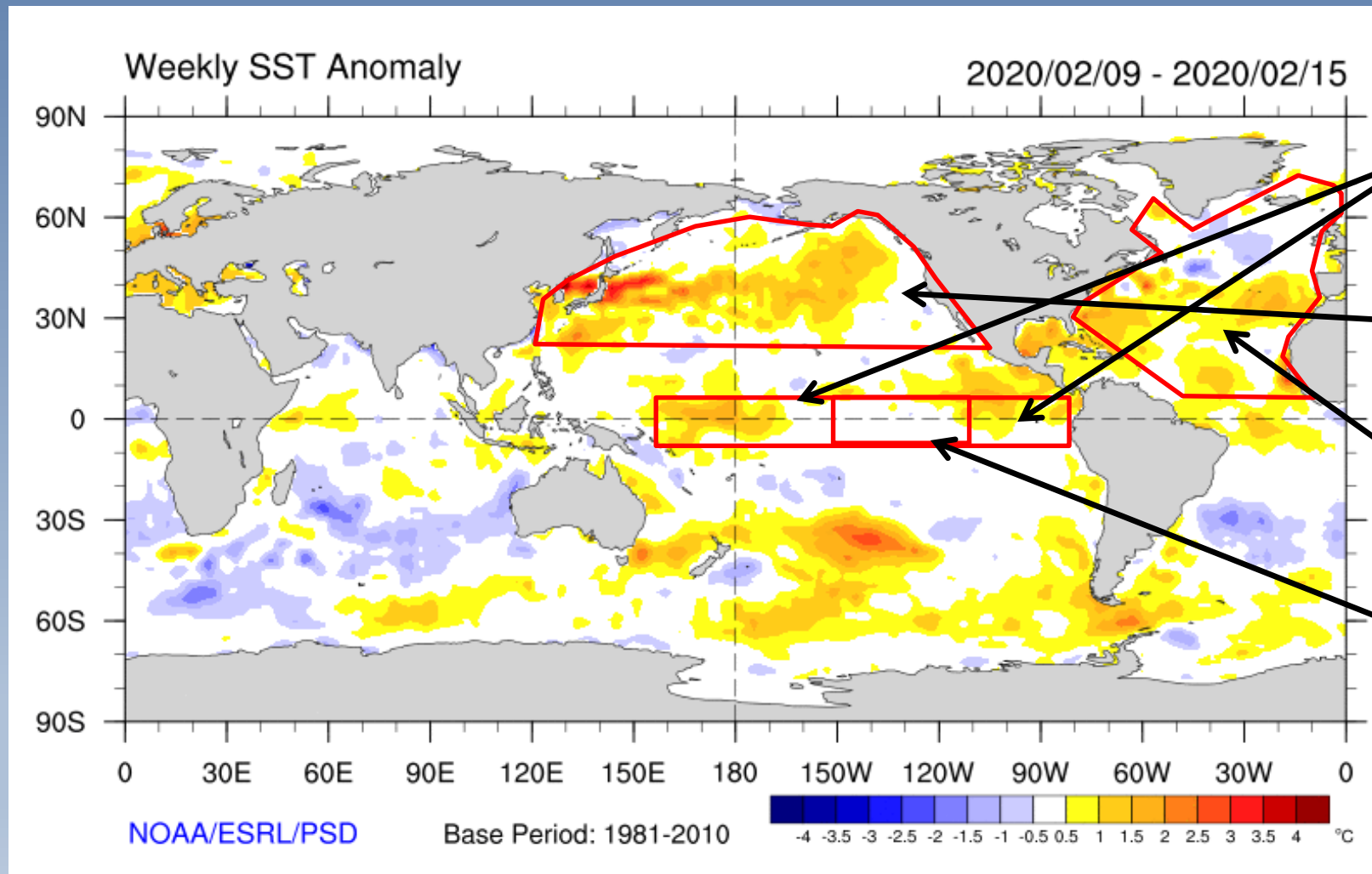
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- Multivariate ENSO Index (MEI) for DEC_JAN 2019-20: **+0.3**
- Pacific Decadal Oscillation (PDO) for JAN 2020: **-0.23**
- Atlantic Multidecadal Oscillation (AMO) for DEC 2019: **+0.16**
- Oceanic Niño Index (ONI) (uses Niño 3.4 region - inner rectangle) for NDJ 2019-20: **+0.6**

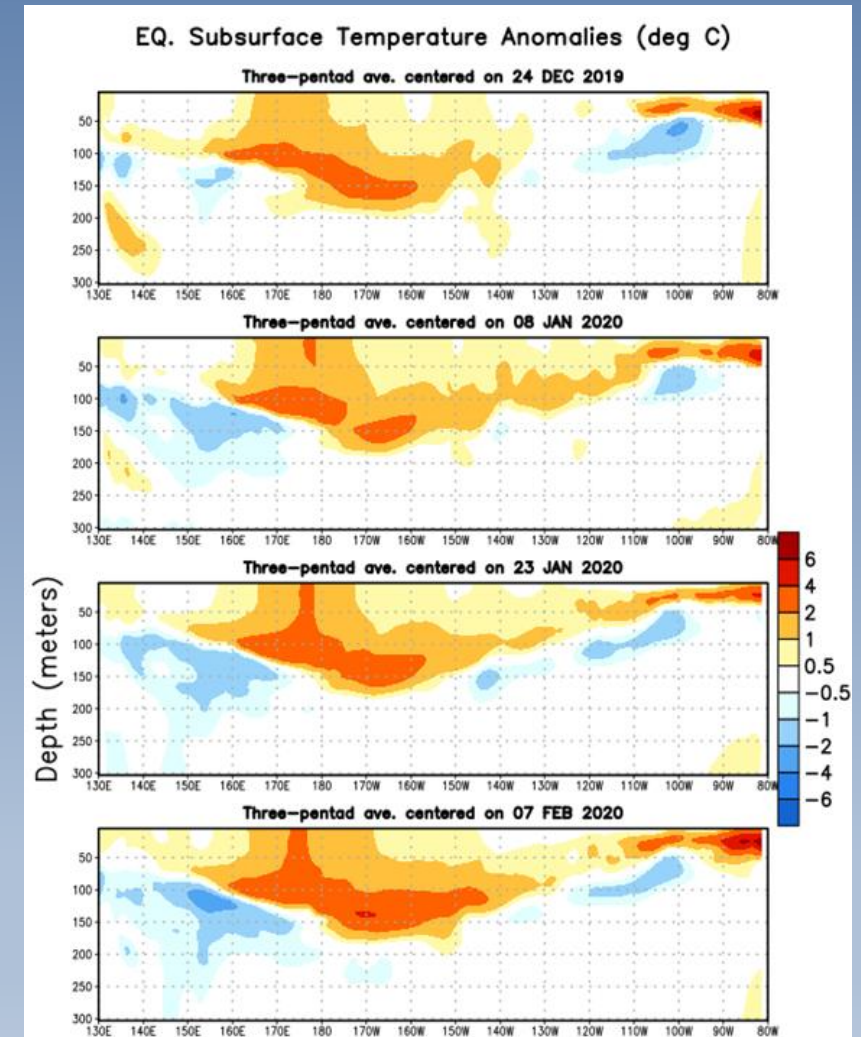
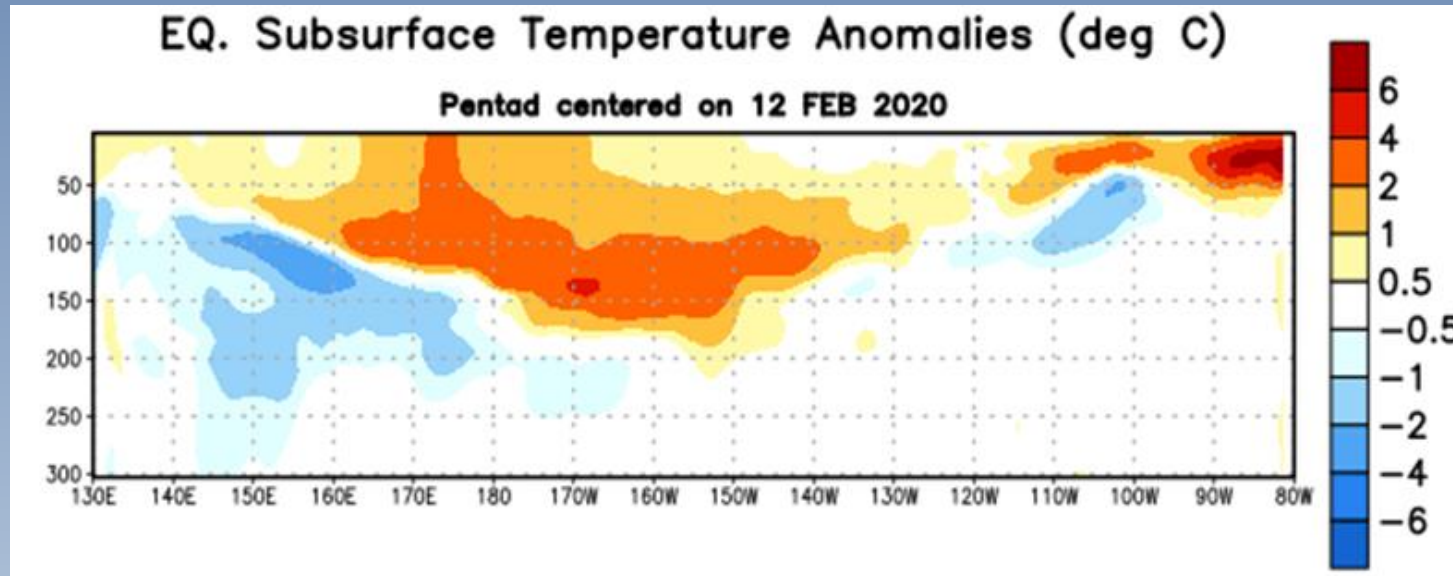
Figure 2. Latest weekly global SST anomalies showing warmer than average temperatures in portions of the eastern equatorial Pacific Ocean.

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Figures 3 and 4. Positive sub-surface temperature anomalies in the central Pacific continue while negative anomalies in the eastern Pacific continue to gradually fade.

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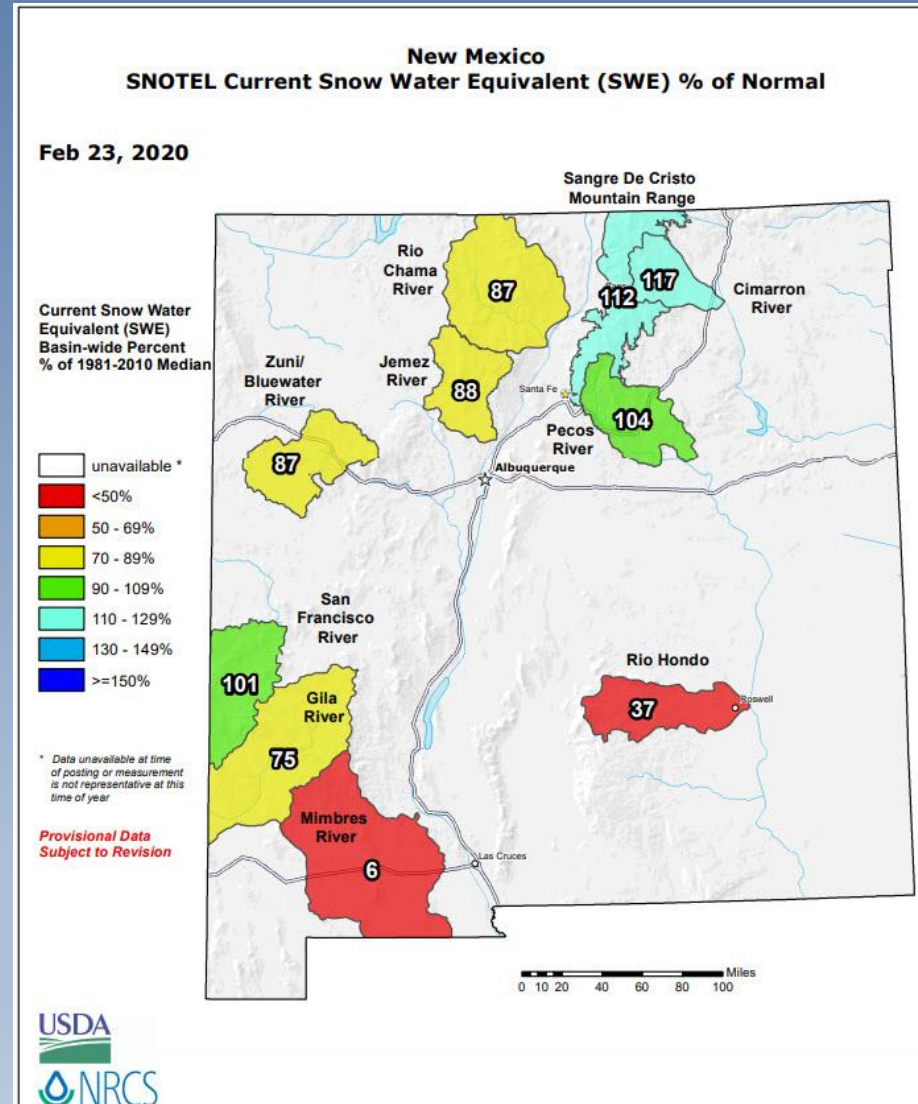


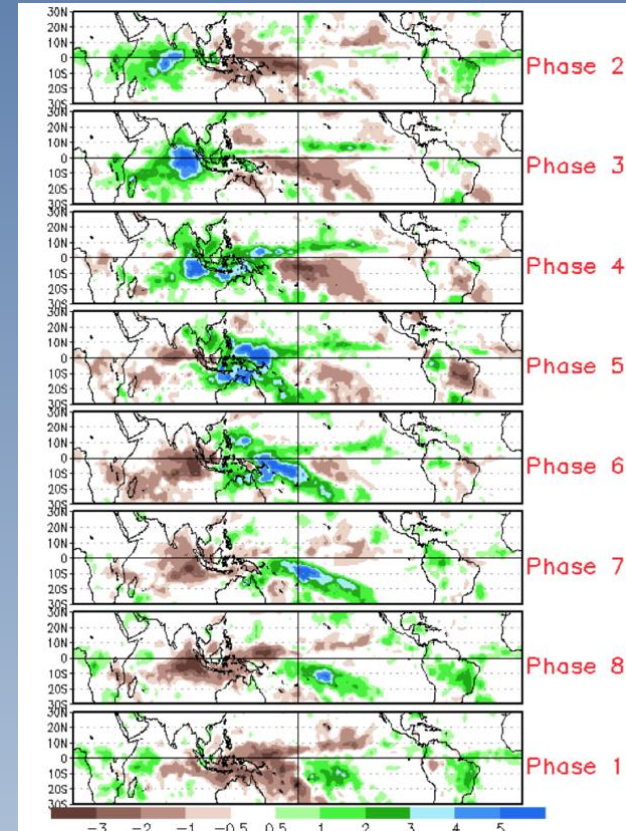
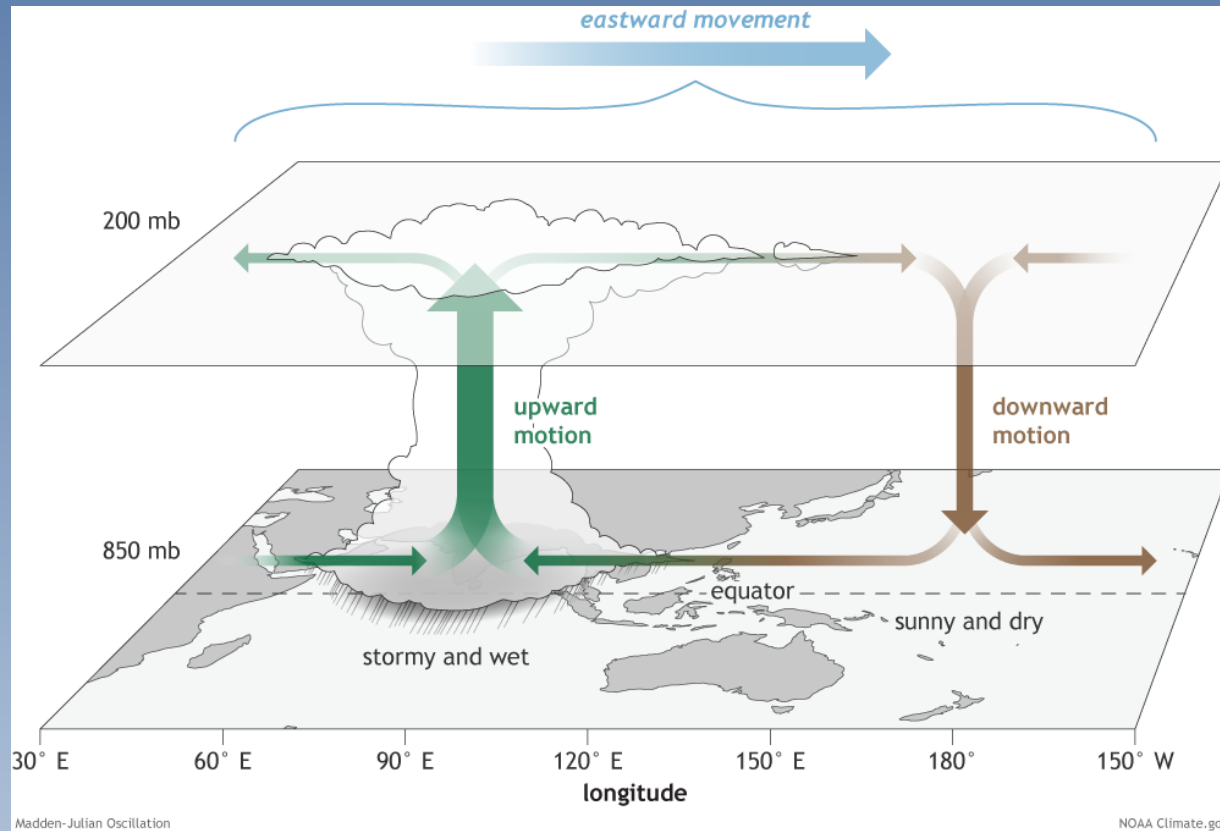
Figure 5. Snow-water equivalent anomaly (% of average) as of 2/23/2020. The majority of watersheds in NM are near to slightly above 1981-2010 averages.

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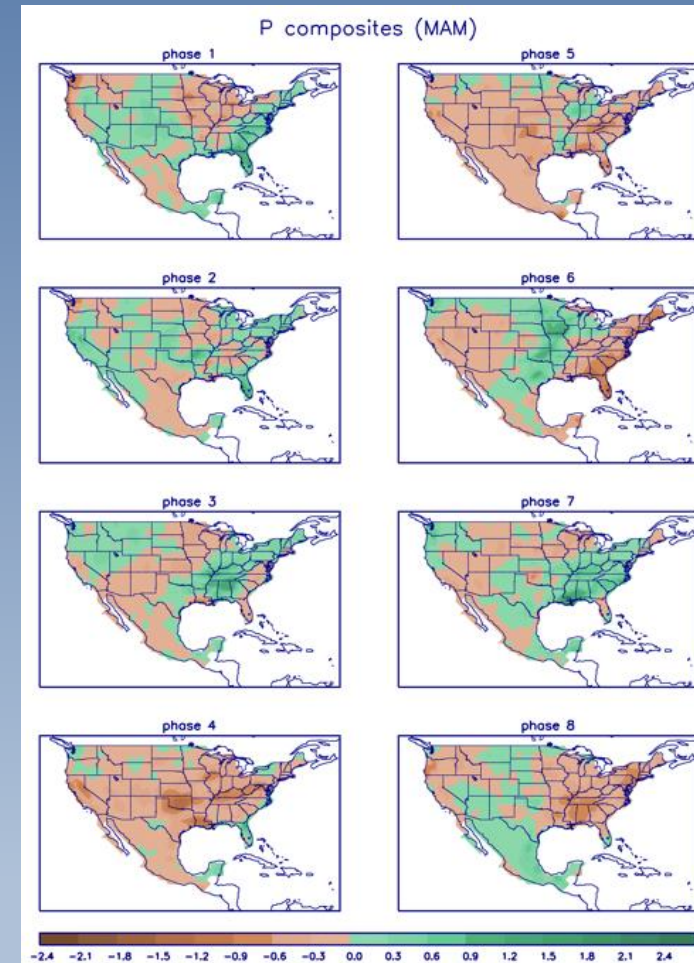
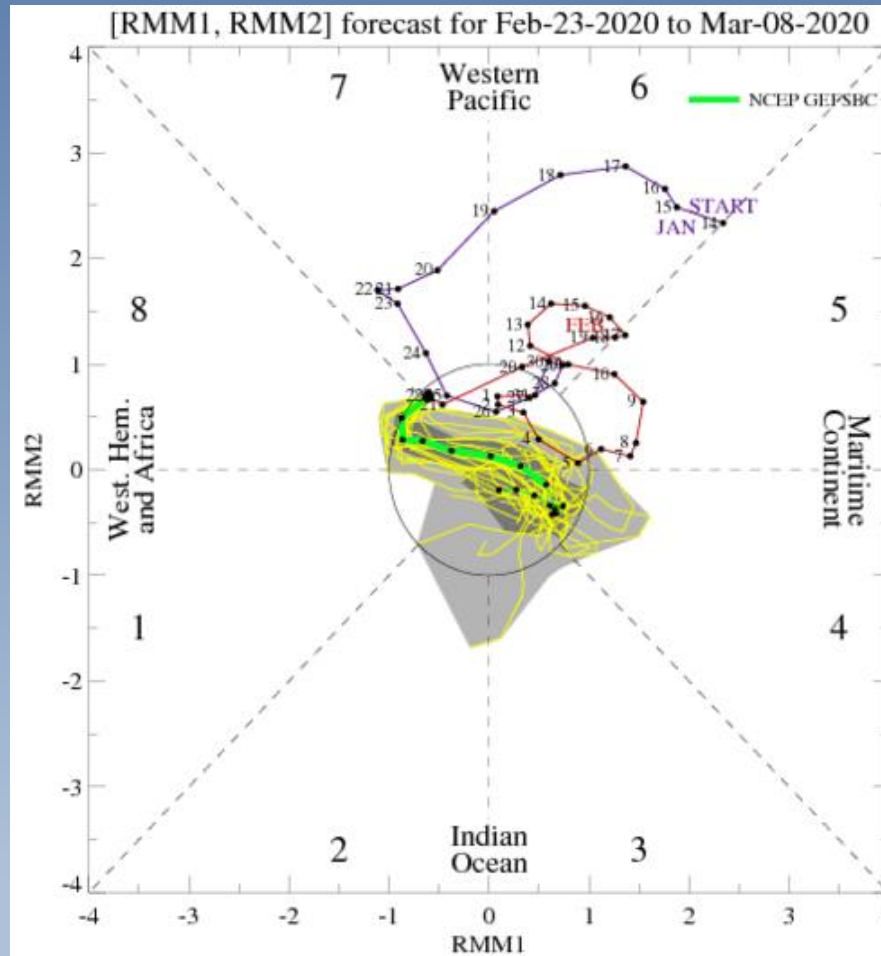
Figures 6 and 7. The Madden-Julian Oscillation (MJO) is an area of enhanced thunderstorms that travels around the world every 30 to 60 days from west to east along/near the equator. An active MJO's importance on the weather/climate impacts for the Southwest U.S. cannot be overstated. Ahead and behind the active stormy area are areas of suppressed convection and drier conditions. The MJO affects near-surface wind patterns, because the rising air in the stormy area causes surface winds to blow toward this area. During El Niño, the trade winds are weaker than average, allowing surface waters to warm (vice versa during La Niña). If the MJO is active, it typically changes the wind patterns temporarily. During February 2020, the MJO was quite active and stalled in phases 7/8 for much of the month.

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Figures 8 and 9. Phase diagram showing the evolution of the last 40 days of observations (left) along with the 15 day ensemble GFS forecast. The yellow lines are the twenty ensemble members and the green line is the ensemble mean (thick-week 1, thin-week 2). The dark gray shading depicts 90% of the members fall in this area and the light gray shading indicates 50% of the members.(green signifies anomalous convection in the Pacific during the past two weeks or an MJO stuck in phases 7 & 8). Precipitation composites in MAM on the right (green means above average precipitation) during each MJO phase.

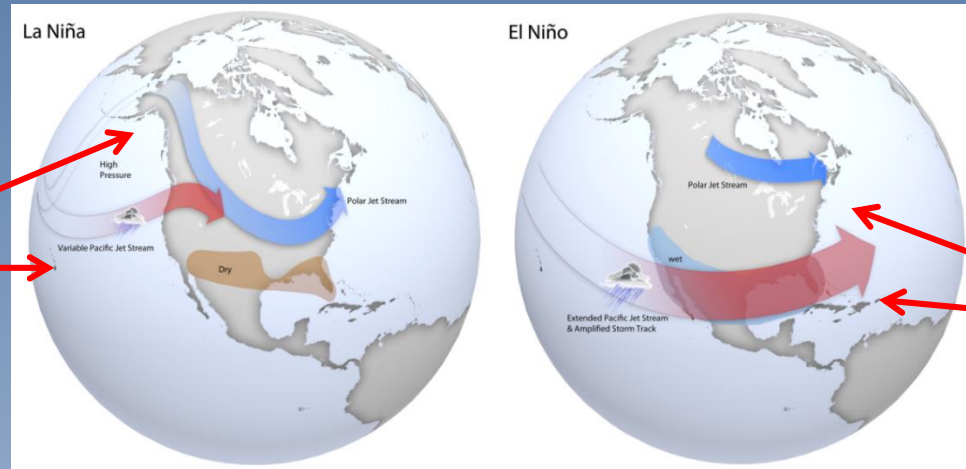
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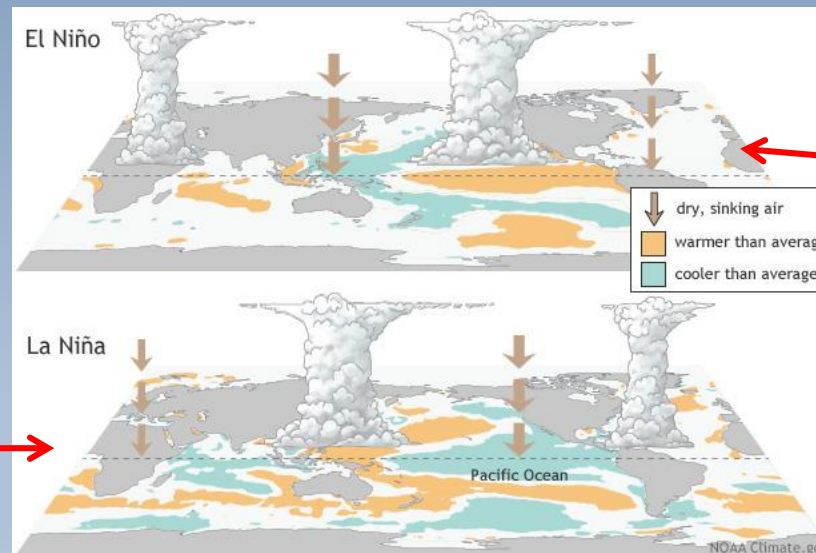
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Typical Jet
Stream Pattern
during La Niña



Typical Jet
Stream Pattern
during El Niño

Typical Tropical
circulations
during La Niña



Typical Tropical
circulations
during El Niño

Figures 10 and 11. Warmer SSTs support deep tropical and subtropical convection farther east than average. This deep convection draws the jet stream farther south into the far eastern Pacific Ocean and southwestern United States during El Niño. The opposite is true during moderate to strong La Niñas and the polar jet stream generally remains north of New Mexico. Weak La Niñas are sometimes wetter and cooler than average.

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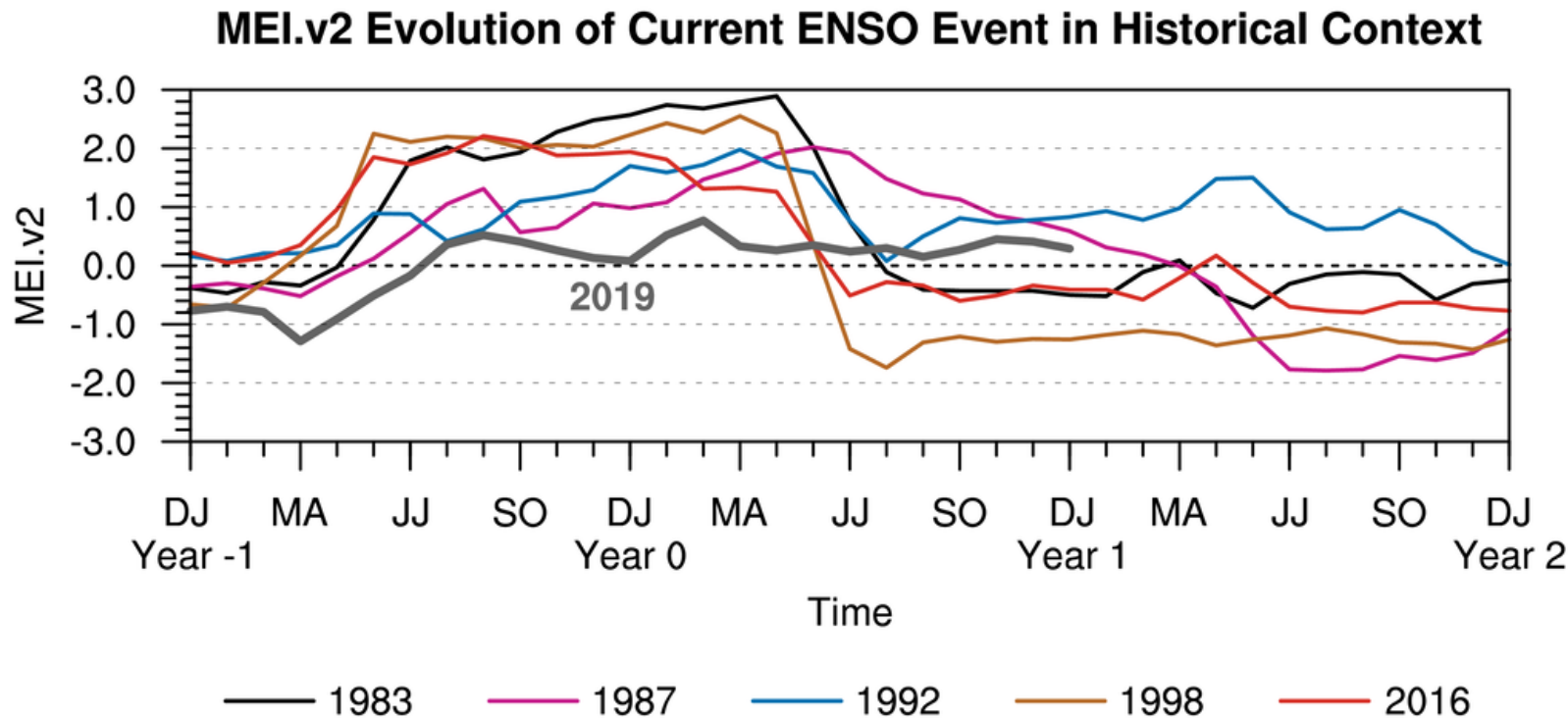


Figure 12. Multivariate ENSO Index (MEI) with five relatively recent late winter seasons similar to 2020. While analog years are getting harder to come by given a changing global climate system, there are two more recent spring seasons where SSTAs were somewhat similar to current conditions, 1998 and 2016.

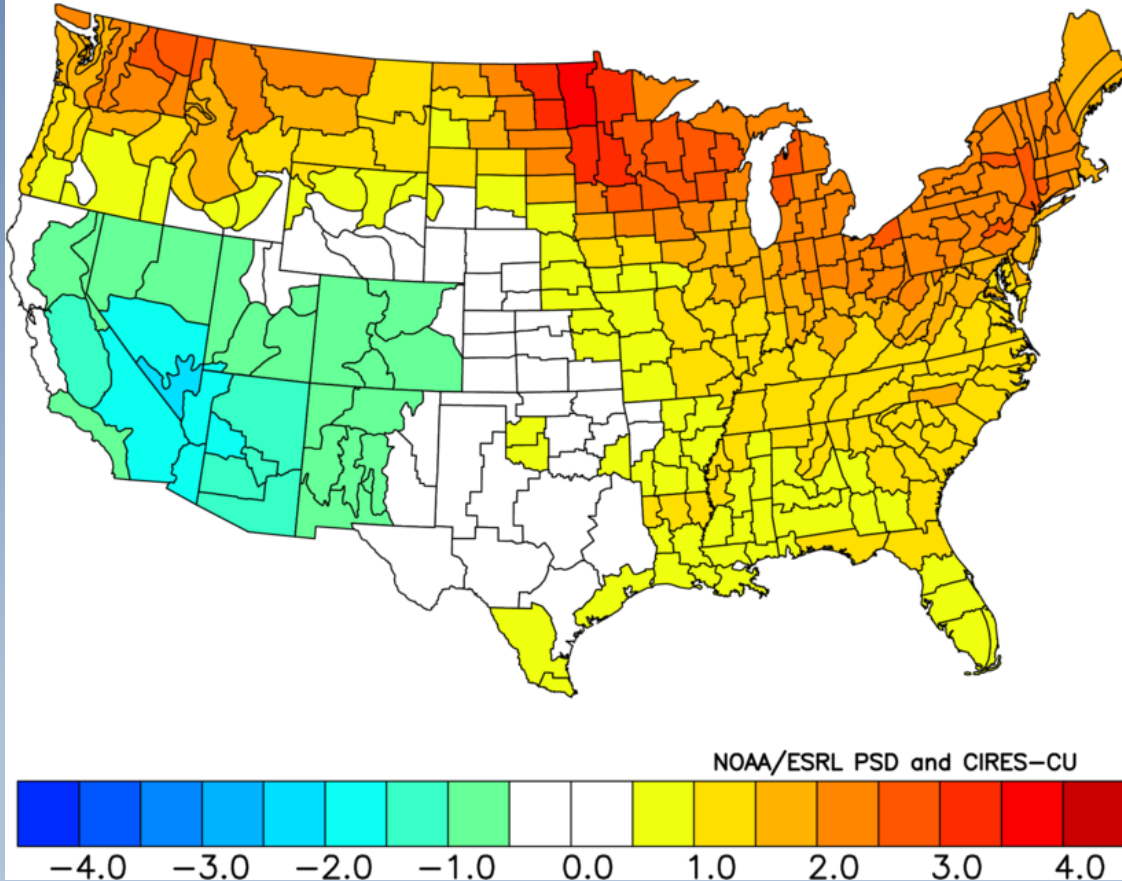
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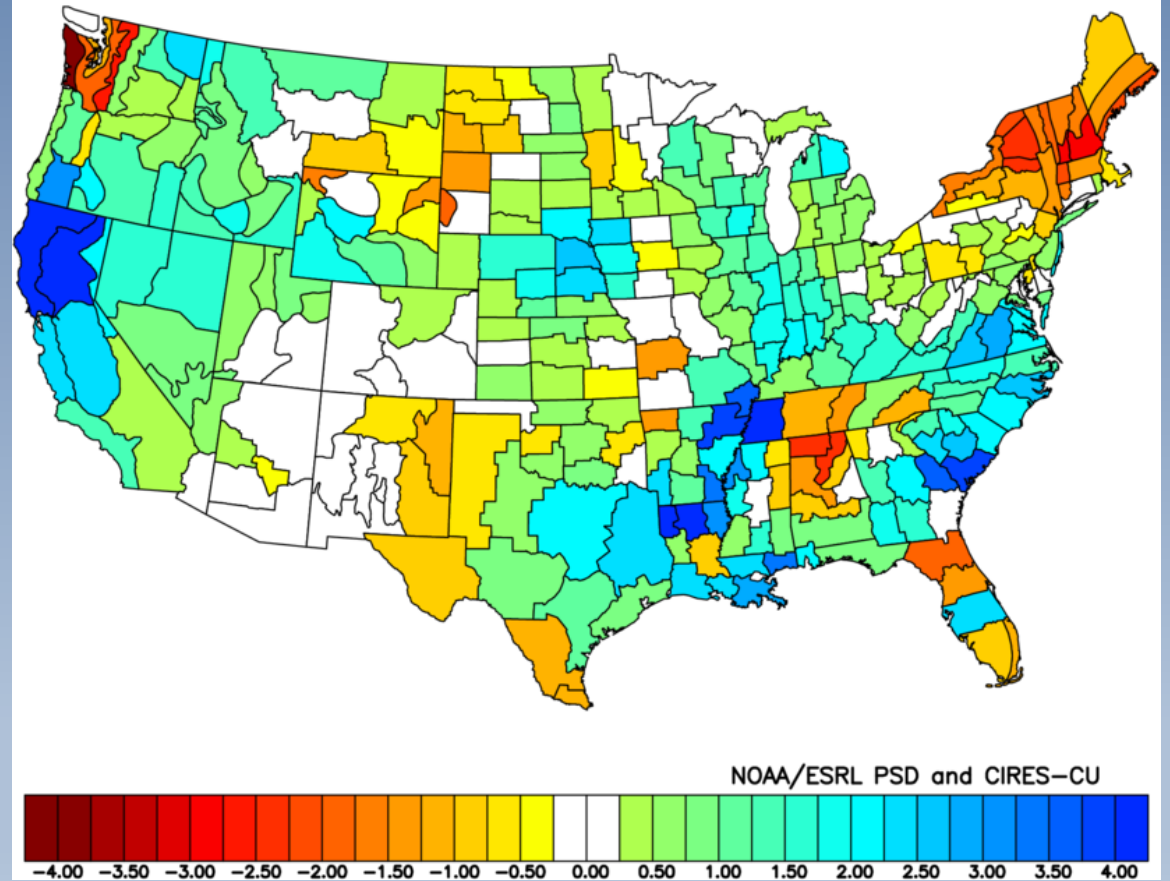


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NOAA/NCEI Climate Division Composite Temperature Anomalies (F)
Mar to May 1998,2016
Versus 1981–2010 Longterm Average



NOAA/NCEI Climate Division Composite Precipitation Anomalies (in)
Mar to May 1998,2016
Versus 1981–2010 Longterm Average



Figures 13 and 14. During two recent analog years, 1998 and 2016, temperatures were near to slightly below 1981–2010 averages (left) for central and western NM while precipitation was slightly below to below average east and north.

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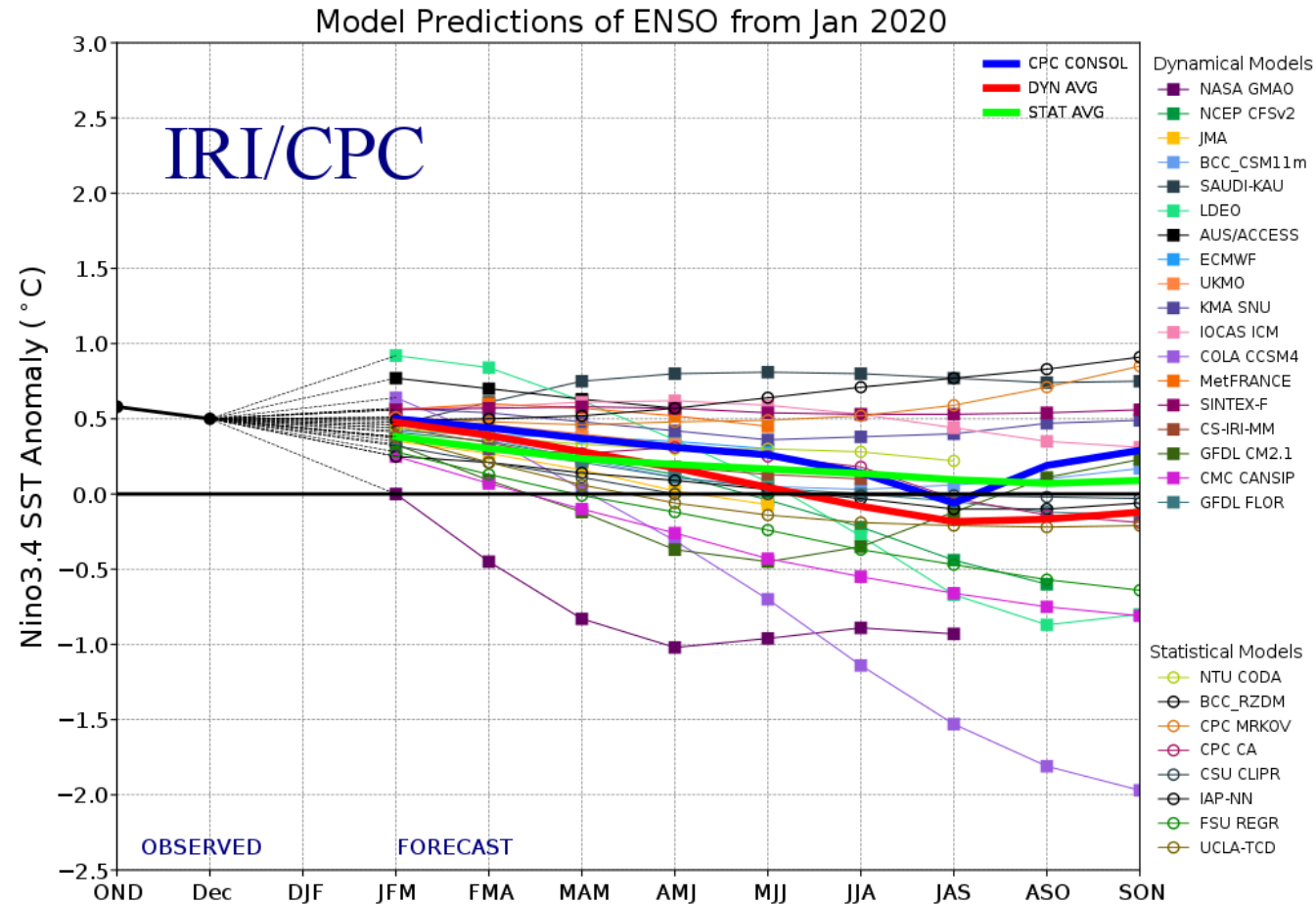


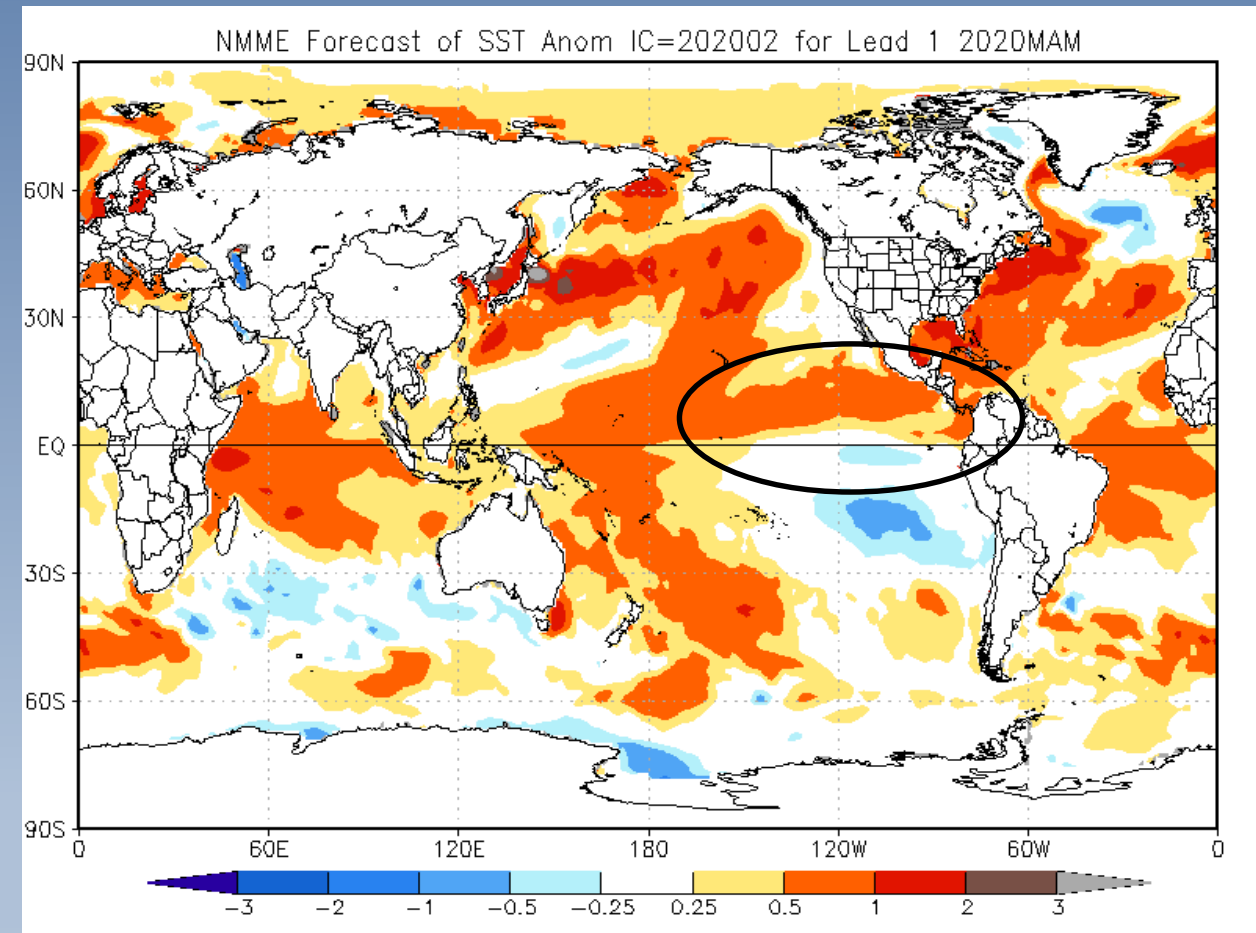
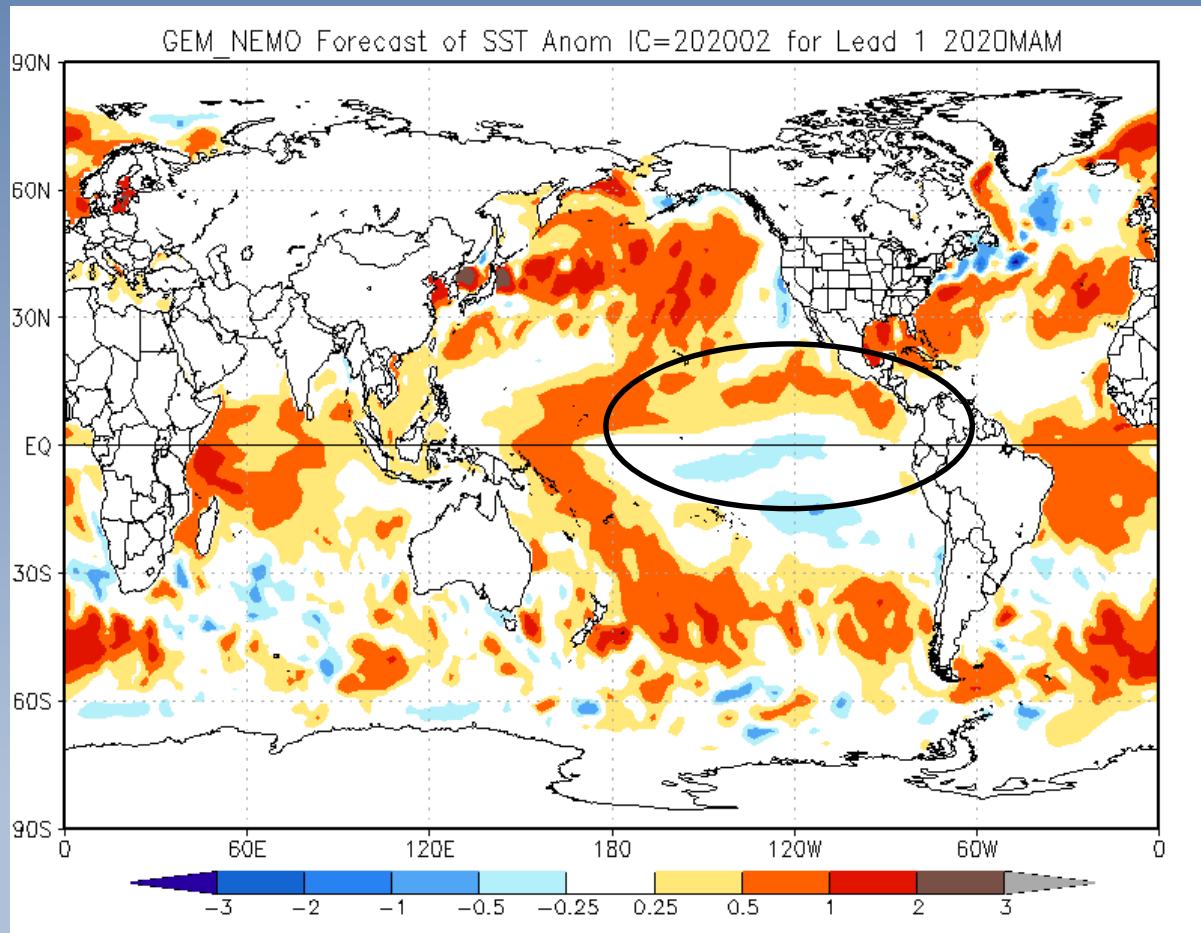
Figure 15. A vast majority of climate model forecasts keep SSTAs in the eastern equatorial Pacific in neutral to weak La Niña territory (between -0.5°C and $+0.5^{\circ}\text{C}$) during the northern hemisphere spring (MAM) 2020.

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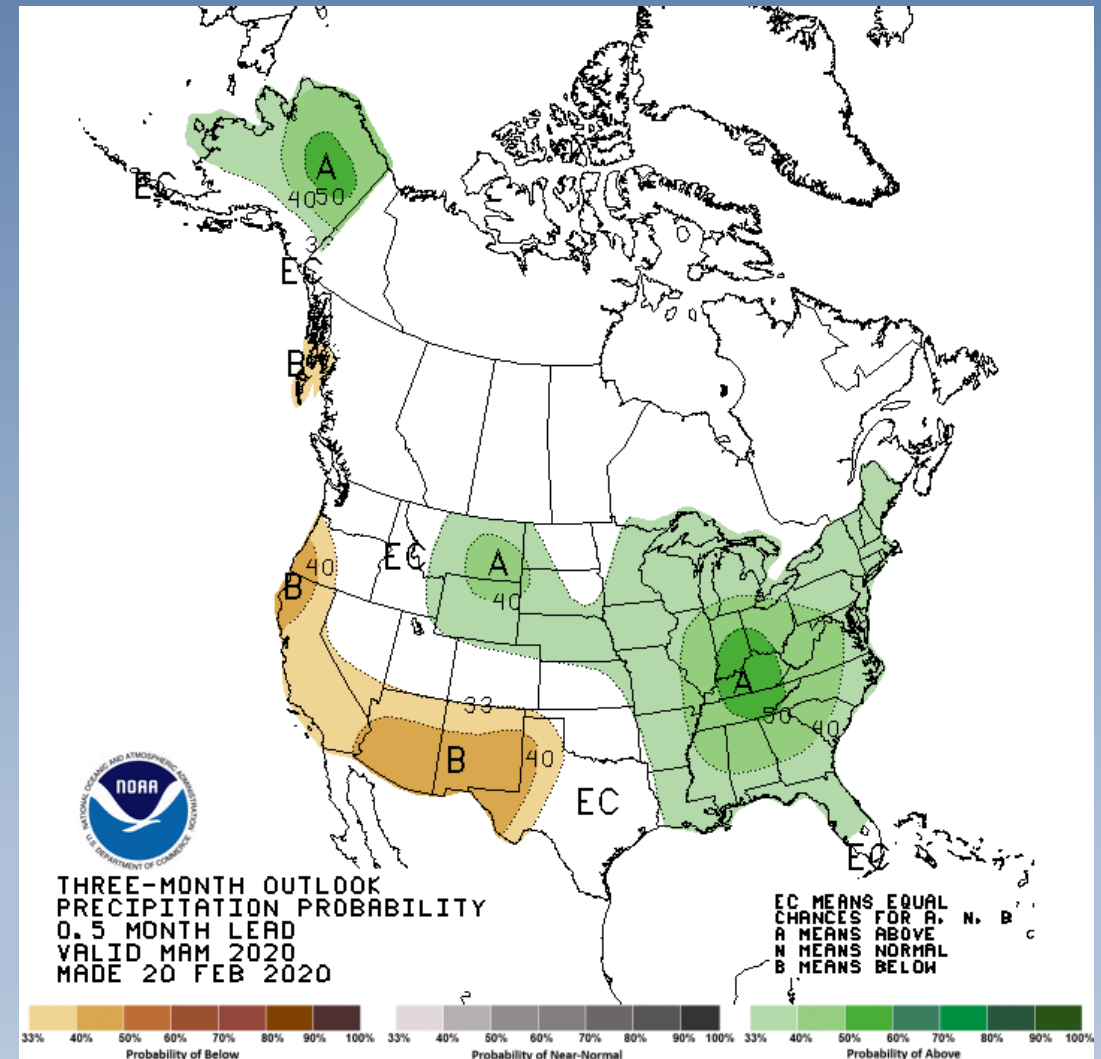
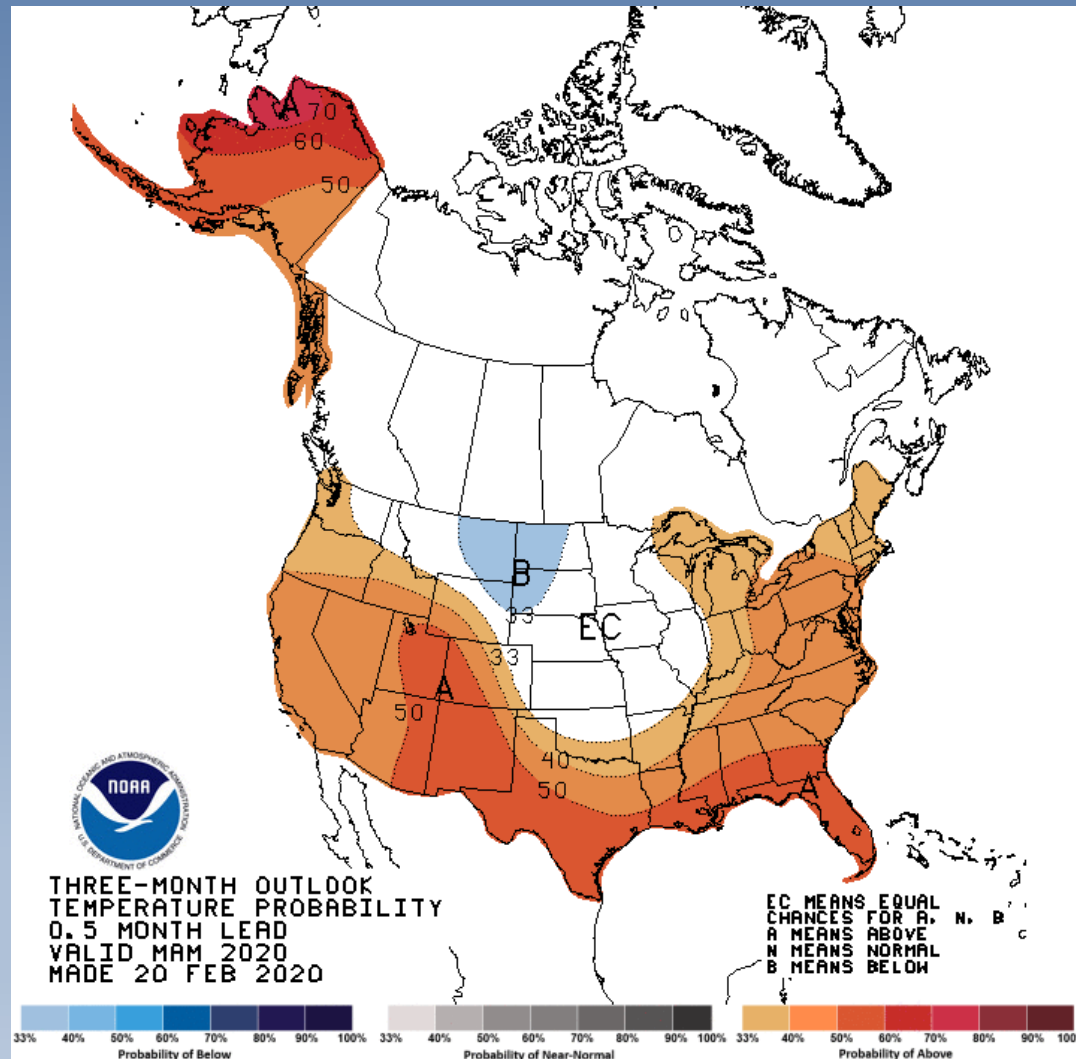
Figures 16 and 17. What matters in climate forecasting? It's mainly about where sea surface temperature (SST) gradients set up in the Pacific Ocean. Climate models with the highest skill score for Pacific Ocean SSTs forecast a favorable location for near to slightly above average precipitation in NM (mainly early on in spring).

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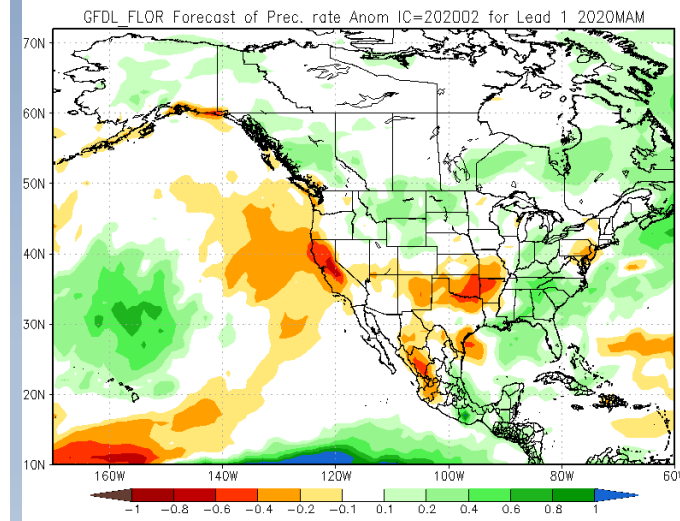
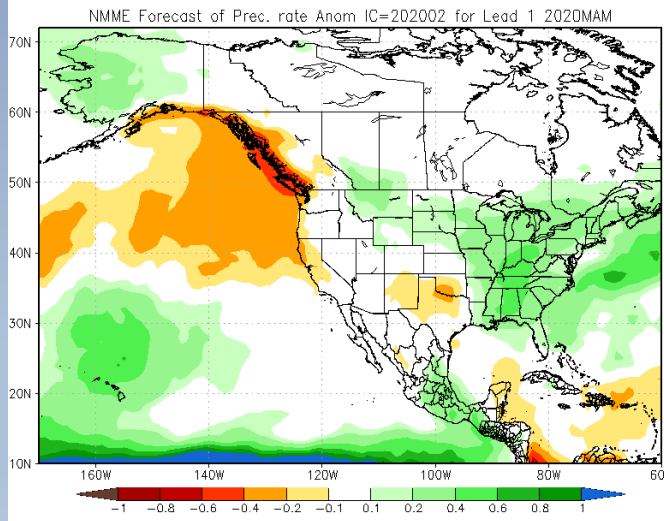
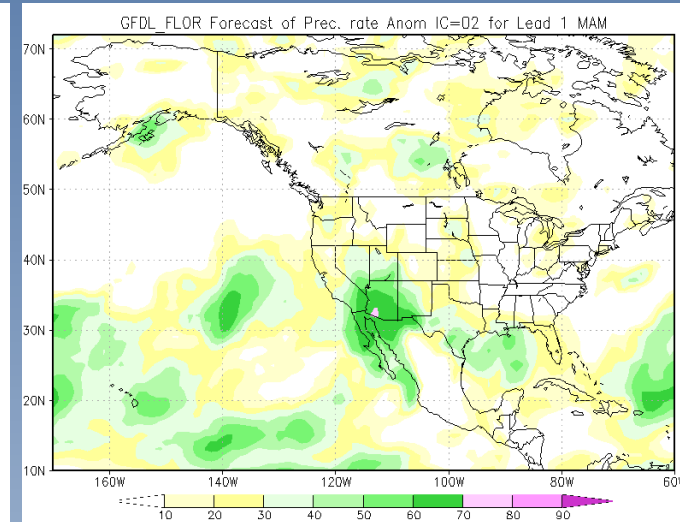
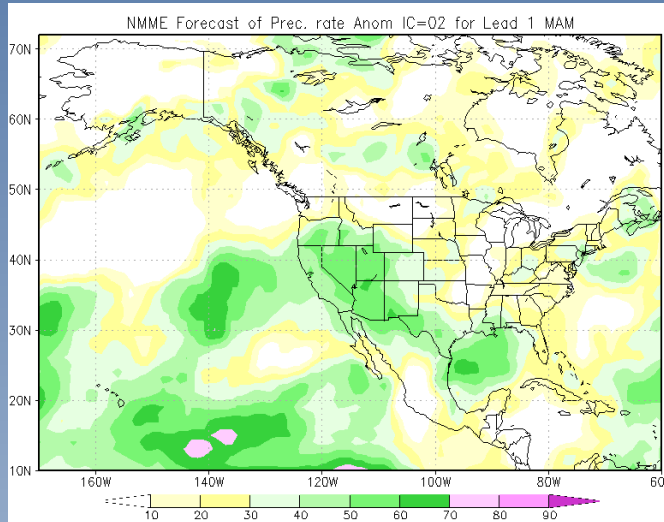
Figures 18 and 19. Climate Prediction Center's Official meteorological spring (MAM) 2020 Outlook favoring above average temperatures and slightly below to below average precipitation.

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Figures 20-23. Model precipitation rate anomaly from the two climate models that have the highest forecast skill percentages (top two images), the North American Multi-Model Ensemble (NMME) and the Geophysical Fluid Dynamics Laboratory (GFDL FLOR) model. Both model forecasts are predicting slightly below to below average precipitation for MAM 2020.

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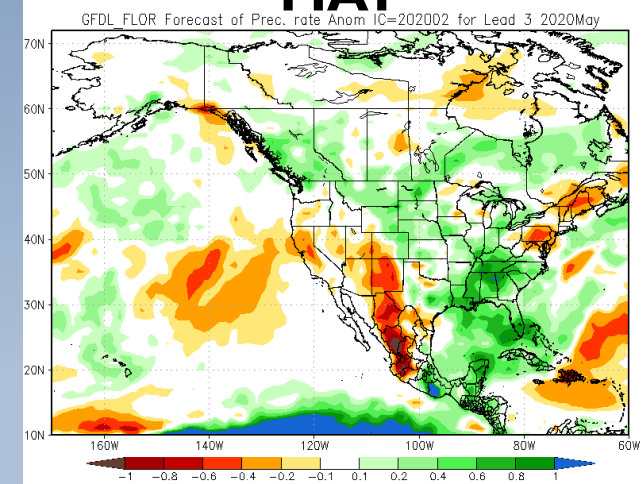
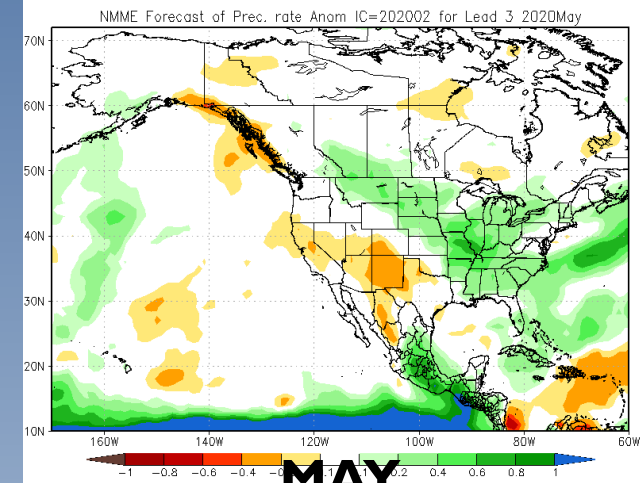
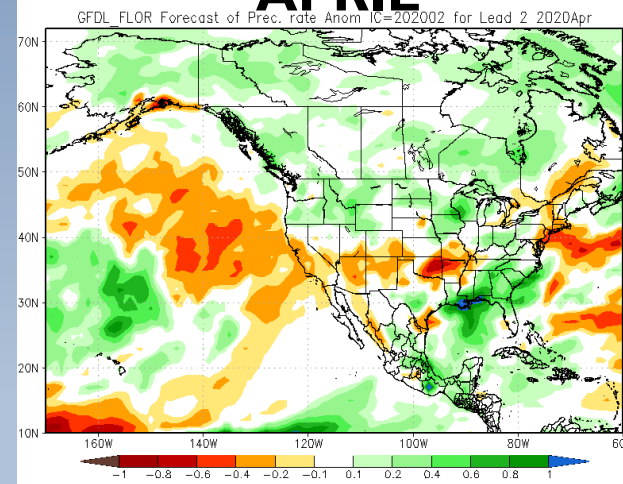
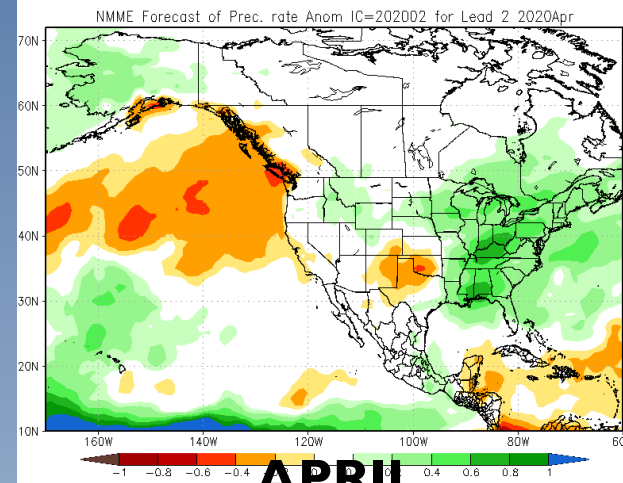
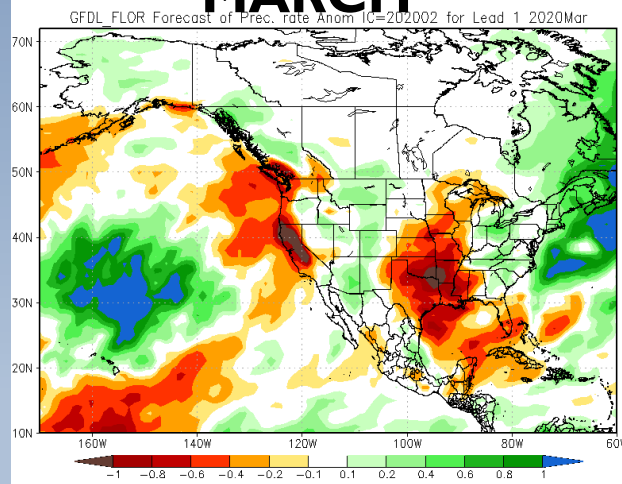
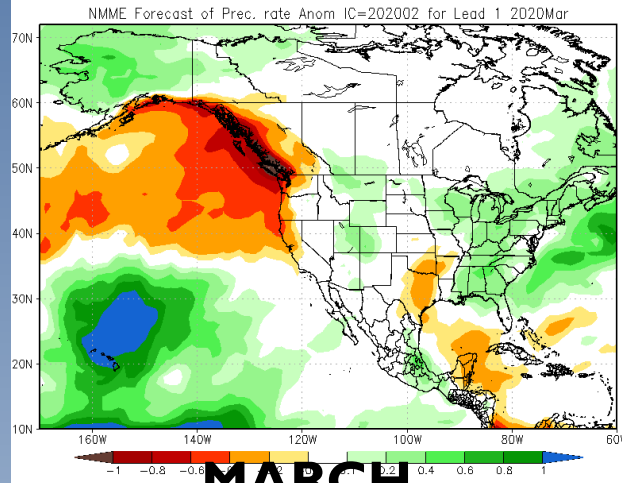


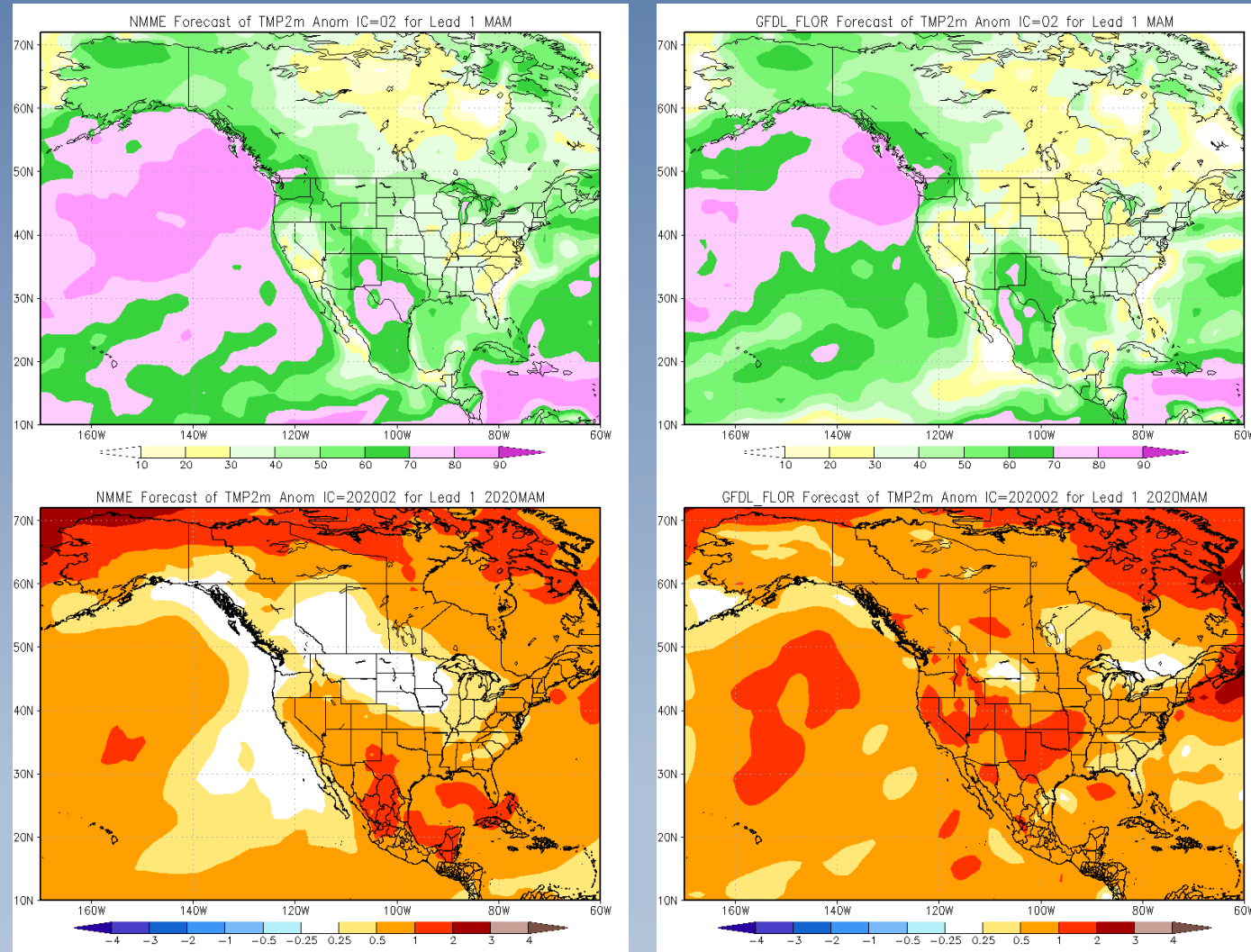
Figure 24-29. NMME and GFDL_FLOR model precipitation forecasts by month. Both models forecast a drying trend as spring progresses. Something to keep in mind, however, is that the December and January 2020 climate models forecasted a drying trend to start in March and have since backed away from this trend. What is the main takeaway you ask? Take the April and May forecast with somewhat of a grain of salt given the forecast trend through winter and the fact that this positive Pacific-North American pattern is considered a “preferred” atmospheric pattern that will most likely take time to change.

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Figures 30-33. Model temperature anomaly from the two climate models which have the highest forecast skill percentages (top two images), the North American Multi-Model Ensemble (NMME) and the Geophysical Fluid Dynamics Laboratory (GFDL_FLOR) model. Both models are predicting above average temperatures for MAM 2020.

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- Forecasts from the most highly skilled climate forecast models indicate that precipitation in central and northern New Mexico during March, April and May (MAM) 2020 will most likely range from slightly below to below 1981-2010 climatological averages.

Forecasts from the most highly skilled climate models suggest temperatures will be above average in MAM 2020.

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